



## MAGIC VALLEY HATCHERY

1998 Brood Year Report



By

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## ABSTRACT

The 12th year (May 1, 1998 to May 12, 1999) of steelhead *Oncorhynchus mykiss* production at Magic Valley Hatchery (MVH) was completed with a total of 1,963,257 smolts planted. However, an estimated 21,851 fish of that total remained in Squaw Creek Pond to be caught-out or planted-out as catchables. As a result, only 1,941,406 of the A-run and B-run steelhead (471,608 lbs) stocked were considered smolts. These smolts, catchables, and presmolts weighed a combined 480,387 lbs. Fish were fed 574,392 lbs of feed for a conversion of 1.20 (lbs of feed per lb of gain).

Four different stocks of steelhead were received as eyed-eggs, including 887,000 A-run Pahsimeroi Fish Hatchery (PFH) steelhead eggs yielding a total of 819,902 smolts. Another 123,540 Oxbow Fish Hatchery (OFH) A-run eggs were determined to be in excess of smolt needs and were planted as presmolts (106,950) into Oakley and Salmon Falls Creek reservoirs. The B-run East Fork Salmon River eggs totaled 7,700. These East Fork eggs were mixed with the Dworshak lots yielding a total of 1,303,112 Dworshak, Clearwater hatcheries B-run eggs, contributing 1,121,504 smolts back to the Salmon River and its tributaries. Further stocking information is located in Appendix C.

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## **INTRODUCTION**

Magic Valley Hatchery (MVH) is part of the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP), compensating for losses of steelhead caused by the Lower Snake River Dams. The hatchery was constructed by the U.S. Army Corps of Engineers (USACE), is administered and funded by the U.S. Fish and Wildlife Service (USFWS), and operated by the Idaho Department of Fish and Game (Department).

The hatchery is located in Twin Falls County, seven miles northwest of Filer in the Snake River Canyon. The hatchery uses a maximum 125 cubic ft per second (cfs) of 59°F water from Crystal Springs, which is located on the north shore of the Snake River.

All smolts were transported by truck to the Salmon River and its tributaries. The brood sources were Dworshak National Fish Hatchery (DNFH) B-run stock, East Fork Salmon River B-run stock, OFH A-run stock, and PFH A-run stock.

Fish health was good again this year.

## **OBJECTIVES**

1. Hatch and rear two million A-run and B-run steelhead smolts for stocking in the Salmon River and its tributaries to achieve the mitigation goal of 11,660 adult steelhead back to Idaho waters.
2. Provide smolts and consequently returning adults that could be utilized for harvest, broodstock supplementation, reintroduction, and research purposes.
3. Mark hatchery smolts prior to release to avoid mixed stock harvest and to maximize harvest and natural production management options.

## **FACILITIES**

The hatchery building houses the incubation and early rearing room with 40 upwelling 12 gpm capacity incubators. It also houses an office, laboratory, wet laboratory, shop, dormitory, enclosed storage room, covered vehicle storage area, feed storage room, walk-in freezer, and a mechanical room for water pumps and water chiller. Each incubator is capable of handling and hatching 50,000 to 75,000 eyed-eggs. Two incubators are placed over each raceway. There are twenty 4-ft x 3-ft x 40-ft concrete tanks, with 418 cf of rearing space, capable of rearing 115,000 to 125,000 steelhead up to a size of 200 fish per lb. The early rearing room also houses two 2-ft x 1-ft x 12-ft fiberglass troughs and 60 automatic fry feeders. The domestic water supply storage tank is located in a 10-ft x 12-ft metal building adjacent to the domestic well.

There are 32 10-ft x 3-ft x 200-ft outside rearing raceways, with 6,153 cf of rearing space. These raceways slope in opposite directions, resulting in 16 East raceways and 16 West raceways. Each raceway has the capacity to raise 60,000 to 70,000 smolt-size steelhead. The raceways may be further divided to form 64 individual rearing subunits. A moveable bridge equipped with 16

automatic Neilsen fish feeders spans the outdoor raceways. Two 30,000 lb bulk feed bins equipped with fish feed fines shakers and a feed conveyor complete the outside feeding system.

There are two outside tailraces located on opposite ends of the facility. Each flows to the north, where they join in a common pipe before entering the flow-through settling pond. The hatchery effluent water is treated by opening valves in the bottom of the quiescent zone and sweeping wastes into a wastewater-cleaning pond (approximately 2.5 surface acres). A hatchery flow-through wastewater pond (about 1.5 surface acres in size) settles the non-cleaning wastewater. All cleaning effluent passes through both ponds before entering the Snake River.

The limiting factors in producing more smolts at MVH are space and water flows. Density and flow indices may exceed the maximum desired levels of .30 lbs of fish per cf of rearing space per inch of fish length, and 1.25 lbs per gal per minute (gpm) per inch of fish length at the end of the rearing cycle. Water flows have increased in recent years and have approached the 125.47 cfs maximum water right for this facility. However, high flows are normally in the 110 to 120 cfs range.

## **WATER SUPPLY**

The MVH water supply collection facility is located on the north wall of the Snake River canyon. It collects the 59°F spring water from Crystal Springs in a covered concrete channel system that consolidates the flow in a metal building. A 42-inch pipeline delivers water by gravity flow to a control tank that degasses and distributes the water to the outside raceways. Water may be diverted from the headrace supply line for use in the auxiliary supply waterlines. The auxiliary supply line allows supplemental water usage between raceway sections to improve water quality in the lower sections. It also allows cleaning of the upper quiescent zones without dewatering the bottom section. The hatchery building receives water through a 14-inch pipeline, which branches off prior to going through the outside degassing tower. Water going to the hatchery building is degassed in packed columns above each individual raceway.

## **STAFFING**

The MVH is staffed with four permanent employees: Bob Moore, Fish Hatchery Manager II; Dave May, Assistant Hatchery Manager; and Fish Culturists Mark Olson and Damon Keen. Fish Culturist Kent Hills left in February when he was promoted to Assistant Fish Hatchery Manager at OFH. Temporary bio-aides or laborers are sometimes hired to assist with fish culture duties during peak production, smolt transportation, and adipose (AD) fin clipping. Marcus Day was our Bio-aide again at the beginning of this brood year. Marcus left in September of 1998 and was replaced by Mary Rosen in March 1999. Personnel from this hatchery continue to oversee adipose marking operations at the three steelhead hatcheries located in southern Idaho.

## **FISH PRODUCTION**

### **Egg Shipments and Early Rearing**

The hatchery received 1,295,412 B-run (DNFH) eyed-eggs, 7,700 B-run eyed-eggs (East Fork Salmon River stock), 887,000 A-run eyed-eggs (PFH stock), and 123,540 A-run eyed-eggs (OFH stock). All eggs were received in April, May, and June 1998. The survival of eyed-eggs to smolts is found in Appendix A.

All eggs received were treated with Povidone-Iodine at 100-ppm for ten minutes, enumerated by displacement and put into the upwelling incubators (50,000 to 75,000 eggs per incubator, 15 gpm). The eggs hatched within five days and emerged from the incubators into the hatchery tanks twelve days after hatching. Each of the 20 hatchery tanks (with a flow of 100 to 250 gpm) averaged 120,000 feeding fry until they reached 300 per lb or almost two inches long. At that time, fish were moved to the larger outside raceways. The highest mortality rate was during the hatching, swim-up, and early-rearing stages. This year, survival was comparable in all stocks of eggs. The DNFH eggs generally survived at a much lower rate than the other stocks. Clearwater Hatchery staff became more involved in helping with spawntaking and preparation of eggs for shipping. This may or may not have anything to do with the improved egg survival.

All of the feeding fry were started on Rangen dry feed. This is a change from past years in that soft moist feed was used until fish were moved to the outside raceways.

### **Final Production Rearing**

Fish were fed Rangen 440 extruded salmon diet using Haskell's 1967 feeding rate formula. The feeding rate was calculated using a 10.0 hatchery constant. Fish are started on feed as one-inch swim-up fry and hatchery growth ends with an approximate 8.3-inch smolt. The fish had a conversion of 1.2 lbs of feed to produce a lb of fish.

Generally about one-inch of growth per month for the first three months is achieved when the fish are fed every day. An intermittent schedule of five days on- and two days off-feed was implemented in October to keep the fish from becoming too large. The steelhead maintained an average .65- to .75-in per month growth using this system. This schedule was used through the middle of March, at which time all fish were put on feed seven days a week. See Appendix B for feed and total costs for the year.

Piper's 1970 formulas for density and flow indices were used to calculate the densities and flows for each tank or raceway. The desired density index of .30 or 1.25 flow index was not reached in some raceways until the end of March. The final pond inventories and indices for the individual raceway numbers, densities, and flows are found in Appendix D.

Maximum flows for the year were around 120 cfs from October through March. The majority of the flows were recorded around 100-110 cfs. Each of the 32 outside raceways had about 3.4 cfs prior to distribution in April.

Steelhead smolt distribution began on April 7, 1999 and continued five days a week through May 12, 1999. An average of five trucks per day was used to transport 477,250 lbs of fish and involved 97 truckloads (Appendix C). This year, we continued to haul 5,000 lbs per load to meet IHOT (Integrated Hatcheries Operation Team) recommendations. Slate Creek was deluged by what was described as a 200-year flood. It was deemed unusable for future use, and all smolts destined for Slate Creek were diverted to Squaw Creek Pond.

### **Length Frequency Data**

Length frequencies were taken from all stocks again this year and are shown in Appendix H.

### **PRECOCIAL MALE OBSERVATIONS**

In past years there seemed to have been a direct relationship between the incidence of precocial males and the proximity of the fish to security yard lights. Fish in raceway 16, which is nearest to the yard lights, showed unusually high rates of precocial male fish. This was the case in the spring of both 1997 and 1998. Three lights closest to raceways 16 East and West were eliminated last year; and several more lights near the raceways were turned off this year. Fish were checked internally for precocial development in raceways both near and away from the remaining lights. Results seemed less conclusive this year. Dean Rhine, Department Fishery Biologist from Lewiston, tested precocial rates at Niagara Springs Fish Hatchery (NSFH) and Hagerman National Fish Hatchery (HNFH). He found there were lower precocial rates at those hatcheries, even near yard lights. He also learned that there were many more lumens produced from the Lucolux LU250 bulbs used here than from the types of bulbs used elsewhere. Fish tested here showed an apparent interaction between proximity to light, tagging fish with coded-wire-tags (CWT), and higher precocial rates. In other words, fish injected with a coded-wire-tag and placed closer to lights were more likely to become precocial. Further experimentation will be done next year.

### **FISH HEALTH**

Fish health was good this year. There were no treatments of antibiotics or medicated feed required. Incidental mortality from coldwater disease *flavobacterium psychrophilum* was minimal. Organosomatic index assessments can be found in Appendix E.



## **FISH MARKING**

All of the A-run and B-run hatchery steelhead are required to have an AD fin-clip distinguishing them from wild steelhead. At MVH, the fin clipping crew ad-clipped 2,073,420 fish during September. Fin-clipping mortality was negligible. No treatment was necessary after handling.

Only two groups of steelhead were coded-wire tagged this 1998 brood year. The Oxbows were planted as fingerlings, and the East Forks were combined with Dworshak fish in raceway East # 1. There were 468,989 fish marked with the coded-wire-tag (CWT) and 447,218 of those were stocked. See (Appendix F) for CWT details.

Together, the Pahsimeroi and the Dworshak stocks had a total of 2,399 Passive Integrated Transponder (PIT) tags inserted in them. The Dworshak stock had 1,499 PIT tags implanted and the Pahsimeroi stock had 900 PIT tags implanted. See Appendix F for details.

## **MAINTENANCE PROJECTS**

During the year, the following projects were completed.

1. The shop bathroom was painted.
2. Pieces of carpet were cut and placed in the dormitory bedrooms.
3. A local company patched cracked asphalt in the parking lot.
4. Hatchery restrooms and the visitor center were remodeled to meet ADA guidelines.
5. Residence #1 had the closet removed in living room and new carpet installed. The sliding glass door failed and was replaced with a French-style door.
6. A load-bearing wheel was removed on the bridge and taken to Buhl for repairs.
7. A new heat exchanger coil was installed on the heat pump for the dormitory.
8. Residence #4 had the closet removed in living room and new carpet was installed.
9. A grating system was placed over the end of the raceways for safety.
10. Four overhead doors were installed on the equipment storage area.

## **LITERATURE CITED**

Haskell, D.C. 1967. Calculations of amounts to feed trout in hatcheries. *Progressive Fish Culturist* 19 (4) 194 pp.

Piper, R.G. 1970a. Know the proper carrying capacities of your farm. *American Fishes and U.S. Trout News* 15(1): 4 pp.

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## **APPENDICES**

Appendix A. Brood Year 1998 Steelhead Survival Rates.

	DWORSHAK "B"	PAHSIMEROI "A"	OXBOW "A"	GRAND TOTAL
EGGS	1,303,112	887,000	123,540	2,313,652
% HATCHED	98%	99%	94%	97%
SMOLTS STOCKED	1,121,504	819,902	0	1,941,406
WEIGHT SMOLTS	258,983	212,625	0	471,608
RELEASED AS CATCHABLES*	21,851	0	0	21,851
CATCHABLE WEIGHT*	5,329	0	0	5,329
NO./LB.	4.24	3.85	31	
PRE-SMOLTS STOCKED	0	0	106,950	106,950
PRE-SMOLT WEIGHT IN LBS.	0	0	3,450	3,450
TOTAL NUMBER	1,143,355	819,902	106,950	2,070,207
TOTAL WEIGHT	264,312	212,625	3,450	480,387
% SURVIVAL				
EGG/SMOLT	88%	92%	87%	85%
POUNDS OF FOOD	320,819	248,261	5,312	574,392
CONVERSION	1.1	1.2	1.53	1.2

Appendix B. Brood Year 1998 Production Feed Cost And Utilization.

Number Of Fish	1,963,257
Lbs Of Fish	480,387
Feed Cost	177,716.45
Lbs Of Feed	574,392
Conversion	1.20
Total Cost	\$548,242.00
Cost Per 1000 Fish	\$279.29
Cost Per Lb Of Fish	\$1.14

Appendix C. Steelhead Smolt Distribution in the Salmon River and Tributaries.

Species	Numbers	Lbs	No./Lb	Receiving Waters	Dates Released
Dworshak B-run	74724	18225	4.1	Squaw Creek Pond	4/7-4/9
Dworshak B-run	353375	75000	4.71	Stinky Springs	4/12-4/16
Dworshak B-run	109145	25150	4.34	Tunnel Rock	4/28-5/3
Pahsimeroi A-run	100810	25050	4.02	McNabb	4/23-4/28
Pahsimeroi A-run	106380	25250	4.21	Cottonwood	4/27-4/27
Pahsimeroi A-run	132420	36150	3.66	Shoup Bridge	4/19-4/20
Pahsimeroi A-run	98202	24825	3.96	Tunnel Rock	4/21-4/22
Pahsimeroi A-run	39660	10000	3.97	Sawtooth Rack	4/23-4/23
Pahsimeroi A-run	154195	42100	3.66	Red Rock Acc.	4/16-4/21
Pahsimeroi A-run	175435	46050	3.81	Lemhi R	4/19-4/26
Pahsimeroi A-run	12800	3200	4	Stinky Springs	5/6-5/6
Dworshak B-run	204805	49850	4.11	Squaw Creek	4/30-5/11
Dworshak B-run	268925	63800	4.22	East Fork Salmon R	4/29-5/5
Dworshak B-run	110530	26958	4.1	Squaw Crk. Pond Outlet	5/5-5/12
TOTAL:	1941406	471608	4.12		

Appendix D. Final Raceway Inventory with Flow and Density Indices for 1998 Brood Year.

Raceway	Run	Number	Weight	No/lb	Length	Flow Index	Density Index
E1	DWOR/EFK B	59010	14063	4.2	8.56	1.17	0.30
E2	DWOR B	59120	14795	4.0	8.70	1.21	0.31
E3	DWOR B	60865	12950	4.7	8.24	1.12	0.29
E4	DWOR B	57600	12800	4.5	8.36	1.09	0.28
E5	DWOR B	61495	12550	4.9	8.13	1.10	0.29
E6	DWOR B	62220	12200	5.1	8.02	1.09	0.28
E7	DWOR B	62400	13000	4.8	8.18	1.13	0.29
E8	DWOR B	60480	12600	4.8	8.18	1.10	0.29
E9	DWOR B	60800	16000	3.8	8.85	1.29	0.33
E10	DWOR B	61740	14700	4.2	8.56	1.23	0.32
E11	DWOR B	60270	14700	4.1	8.62	1.22	0.32
E12	DWOR B	60800	15200	4.0	8.70	1.25	0.32
E13	DWOR B	62370	14850	4.2	8.56	1.24	0.32
E14	DWOR B	59865	15350	3.9	8.77	1.25	0.32
E15	DWOR B	50534	12325	4.1	8.62	1.02	0.26
E16	DWOR B	45100	11000	4.1	8.62	0.91	0.24
W1	DWOR B	61160	13900	4.4	8.42	1.18	0.31
W2	DWOR B	58300	13250	4.4	8.42	1.12	0.29
W3	DWOR B	57375	12750	4.5	8.36	1.09	0.28
W4	PAH A	66000	16500	4.0	8.70	1.36	0.35
W5	PAH A	65000	16250	4.0	8.70	1.33	0.35
W6	PAH A	62920	14300	4.4	8.42	1.21	0.31
W7	PAH A	62130	16350	3.8	8.85	1.32	0.34
W8	PAH A	63755	15550	4.1	8.62	1.29	0.33
W9	PAH A	61600	15400	4.0	8.70	1.27	0.33
W10	PAH A	67275	17250	3.9	8.77	1.41	0.36
W11	PAH A	62832	15325	4.1	8.62	1.27	0.33
W12	PAH A	61920	17200	3.6	9.01	1.36	0.35
W13	PAH A	62650	17900	3.5	9.09	1.41	0.36
W14	PAH A	61420	16600	3.7	8.92	1.33	0.34
W15	PAH A	61020	16950	3.6	9.01	1.34	0.35
W16	PAH A	61380	17050	3.6	9.01	1.35	0.35
Total		1941406	471608	4.1	8.61	1.22	0.32

Appendix E. Organosomatic Index Expressed in Percent of Normals.

Eyes	Gills	Pseudo-Branch	Thymus	Mes. Fat	Spleen	Hind Gut	Kidney	Liver
100	100	100	100	100	100	100	100	100

Appendix F. Brood Year 1998 Coded-wire Releases

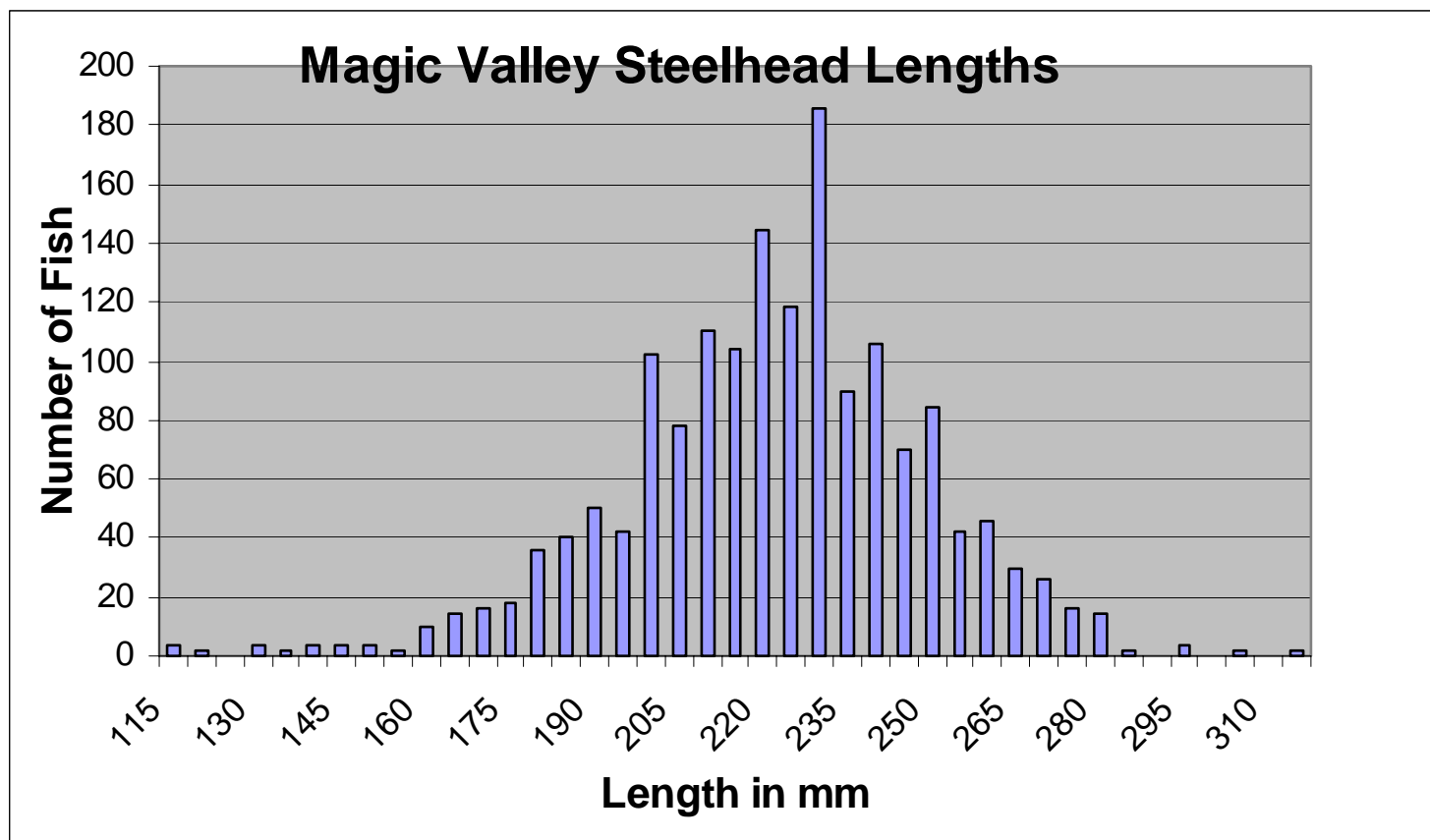
CWT Code	Stock	Number Tagged	Number Stocked	PIT Tag	Site & Purpose	Rcy #
10/52/53-55	Dwor B	61839	59010	300	Squaw Cr Outlet	1 East
10/52/56	Dwor B	20423	20014	299	Stinky Springs	5 East
10/54/02	Dwor B	63747	60800	300	Squaw Cr	12 East
10/54/03	Dwor B	65914	62370	300	East Fork	13 East
10/54/01	Dwor B	60932	57375	300	Tunnel Rock	3 West
10/54/04	Pah A	65596	62382	300	Tunnel Rock	11 West
10/54/05	Pah A	65388	61420	300	Shoup Bridge	14 West
10/54/06	Pah A	32356	31709	300	Lemhi Hole	15 West
10/54/06	Pah A	32794	32138	No	Red Rock	16 West
Total		468989	447218	2,399		

Appendix G. Historical Release Data.

Year	Combined A-run Eggs	East Fork B-run Eggs	Dworshak B-run Eggs	Total Eggs	Spring/Smolt Releases	Fall/Fry Releases	Total Fish Released	Fish per Lb.	Lbs Released	Lbs Feed	Food Conv.
1982-83				145,206	135,361		135,361	4.23	32,000	57,700	2.24
1983-84	238,000		68,000		264,574		264,574	2.77	95,430	154,120	1.62
1984-85				NONE	231,991		231,991	4.37	52,990	HNFB	
1985-86				NONE	NONE				-		
1986-87				NONE	264,415		264,415	4.39	60,215	HNFB	
1987-88		FRY		2,109,780	2,064,661		2,064,661	4.54	454,500	554,000	1.32
1988-89	2,047,748	357,506		2,405,254	2,202,800		2,202,800	4.32	509,100	703,373	1.38
1989-90	1,306,674	333,537	1,212,066	2,852,277	2,285,800		2,285,800	4.67	489,430	687,077	1.40
1990-91	1,269,000	463,730	900,000	2,632,730	2,062,000		2,062,000	4.11	501,100	662,326	1.32
1991-92	1,127,928	91,317	1,207,699	2,426,944	2,160,400		2,160,400	4.21	513,000	624,573	1.22
1992-93	1,031,274	133,826	1,322,740	2,487,840	1,925,700		1,925,700	5.75	334,500	529,936	1.58
1993-94	1,081,500	179,080	1,507,033	2,767,613	1,919,250	392,300	2,311,550	4.73	405,450	654,693	1.61
1994-95	800,785	75,395	1,520,160	2,396,340	1,731,355	26,531	1,757,886	4.41	391,825	548,400	1.49
1995-96	803,000	40,000	1,502,200	2,345,200	1,868,085		1,868,085	4.63	402,926	453,662	1.13
1996-97	947,796	139,400	940,391	2,027,587	1,643,210		1,643,210	4.50	364,775	380,647	1.03
1997-98	855,000	356,340	1,403,900	2,615,240	1,658,825		1,658,825	4.47	370,900	419,222	1.14
1998-99	1,010,540	7,700	1,287,712	2,305,952	1,962,624	106,950	2,069,574	4.12	471,608	574,392	1.20



Appendix H. Brood Year 1998 Length Frequency Graph



Submitted by:

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